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permanent gas from all liquids, except the metals, when exposed to intense heat.

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December 17, 1846.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

“Researches on Physical Geology.”—Part I. The Figure and Primitive Formation of the Earth. By Henry Hennessy, Esq. Communicated by Major North Ludlow Beamish, K.H., F.R.S.

The author's investigations of the figure of the earth proceed on the hypothesis of its having originally been a heterogeneous fluid mass, possessing only such general properties as those which have been established for fluids; and independently of the supposition, with which the theory has generally been complicated, that the volume of the entire mass, and the law of the density of the fluid, have suffered no change in consequence of the solidification of a part of that fluid. Assuming the figure of the mass to be an ellipsoid of revolution, the author obtains general analytical expressions for its ellipticity, and for the variation of gravity at its surface. He gives a general sketch of the consequences that may result from the improved hypothesis of the primitive figure of the earth, to physical geology, that is, to the changes occurring upon the external crust of the earth during the process of its solidification, resulting both from calorific and chemical changes taking place among its different parts, and giving rise to a process of circulation throughout the fluid portions of the mass.

The present memoir is only the first of a series which the author announces it is his intention to communicate to the Society on the same subject.

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January 7, 1847.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

Sir George Back, Capt. R.N., was elected into the Society.

The following paper was read:—

“*Quelques Recherches sur l'Arc Voltaïque; et sur l'influence qu'exerce le Magnétisme, soit sur cet Arc, soit sur les Corps qui transmettent les Courants Electriques Discontinus.*” By M. Auguste De la Rive, Foreign Member of the Royal Society, Professor in the Academy of Geneva, Corresponding Member of the Academy of Sciences of Paris, &c.

In the first section of this memoir the author gives a detailed description of the phenomena exhibited by the luminous voltaic arc produced either in a vacuum or in atmospheric air, or in hydrogen gas, by employing electrodes of different kinds of conducting sub-

stances, in the form either of points or of plates. He examines minutely the transfer of particles which takes place from one pole to the other under these various circumstances, and the differences which occur when the currents are reversed. He observed that when a positive metallic point is presented to a negative plate, particles of the former are transported by the voltaic arc, and deposited on the latter, forming a ring of a regular form, having as its centre the projection of the point on the plate. This happens in atmospheric air whether highly rarified or of the ordinary density, but not in hydrogen gas. This deposit consists always of oxidized particles of the positive metal which forms the pointed electrode. In the case of platinum, the circular spot is of a blue colour, and presents the appearance of the coloured rings of Nobili. This effect the author is disposed to ascribe to the action of the oxygen brought by the voltaic current into that particular condition which Schœnbein first described under the name of *Ozone*. While this deposit is taking place, a vivid blue light is emitted.

In the second section the author investigates the action exerted by a powerful electro-magnet on the voltaic arc. He describes the remarkable modifications which the length, the form, and even the nature of the arc undergoes when the electro-magnet is brought extremely near to it, and the magnetization of the electrodes themselves, when they are susceptible of that affection by their approximation to the electro-magnet. He notices the singular phenomenon of a peculiar sound emitted by the luminous arc, when subjected to this magnetic influence; a sound which varies both in its nature and its intensity according to the nature, the form and the temperature of the electrodes, consisting sometimes of a shrill whistle, and at other times of a series of slight detonations.

The third section is devoted to the investigation of a remarkable phenomenon presented by all the conducting bodies while transmitting discontinuous electric currents, under the influence of a powerful electro-magnet; namely, the emission of a sound resembling that of the revolving toothed-wheel in Savart's experiments. This sound is distinctly heard, and is peculiarly loud with prismatic bars of lead, bismuth, tin, &c., about three-quarters of an inch square and a foot and a half long, whether placed in the direction of a line joining the poles of an electro-magnet, or in a direction at right angles to such line: it was weakened only by increasing the distance between the poles and the bar. The intensity of the sound appeared to depend much less on the nature of the substance which was subjected to this action, than on its form, its volume, and its mass. All conducting bodies, whatever may be their nature, or state of aggregation, are capable of yielding these sounds. They are produced by charcoal of all kinds and shape. Mercury contained in a cylindrical glass tube, of similar dimensions with the metallic bars, emits a sound of great intensity; and a still louder sound arises from a wire coiled as a helix around a cylinder of wood, and also by tubes formed of different metals. Similar phenomena are also observable by the action of a helical coil substituted for the electro-magnet.

On the whole, the author arrives at the conclusion that the phenomena noticed in this paper are altogether molecular, and that they establish the following principles: first, that the passage of the electric current modifies, even in solid bodies, the arrangement of the particles; and secondly, that the action of magnetism, in like manner, produces an analogous modification in the molecular constitution of all bodies. This has already been demonstrated by Faraday in the case of transparent bodies, in its effects on polarized light; and is now extended by M. De la Rive to opaque conducting bodies, by employing, instead of polarized light, a discontinuous electric current.

“On the Ganglia and Nerves of the Virgin Uterus.” By Robert Lee, M.D., F.R.S., &c.

The author states that his recent dissections have enabled him to verify the descriptions he gave of the ganglia and nerves of the uterus in his papers already published in the *Philosophical Transactions*, and also to detect the existence of ganglia situated in the muscular coat of the uterus, and of plexuses of nerves accompanying all the blood-vessels and absorbents ramifying in its walls, between the peritoneum and lining membrane. By examining the hearts of a foetus, of a child of six years of age, of an adult in the sound state, a human heart greatly hypertrophied, and the heart of an ox, he found that there exists a striking analogy between the ganglia and nerves of the uterus and those of the heart. He ascertained by microscopic observation that the muscular and vascular structures of the auricles and ventricles are endowed with numerous ganglia and plexuses of nerves, which, as far as he knows, have not yet been described, and which enlarge simultaneously with the natural growth of the heart, and also continue to enlarge during its morbid conditions of hypertrophy. The author also finds that the size of the ganglia and nerves of the left auricle and ventricle, in the normal state, is more than double that of the corresponding parts on the right side. A description is then given of two elaborate drawings which accompany the paper.

“On a new and practical form of Voltaic Battery of the highest powers, in which Potassium forms the positive element.” By John Goodman, Esq. Communicated by S. Hunter Christie, Esq., A.M., Sec. R.S.

The author succeeded in constructing a voltaic arrangement of some power by fixing a piece of potassium to the end of a copper wire, placed in a tube containing naphtha, and bringing it in contact with a small quantity of mercury, held by a layer of bladder closing the lower end of the tube, which was itself immersed in acidulated water immediately over a piece of platinum, and then completing the circuit by establishing a metallic contact between the copper wire and the platinum. This battery acted with energy on the galvanometer, and effected the decomposition of water. A series of twelve pairs of similar plates exhibited a sensible attraction